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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/642,655	08/22/2000	Edward Brittain Stokes	040849/0143	9163

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EXAMINER

ZIMMERMAN, GLENN

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 02/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/642,655

Applicant(s)

STOKES ET AL.

Examiner

Glenn Zimmerman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) 32-35 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 36-38 and 42 is/are allowed.
- 6) ☒ Claim(s) 1-13, 19-24 and 39-41 is/are rejected.
- 7) ☒ Claim(s) 14-18 and 25-31 is/are objected to.
- 8) ☒ Claim(s) 1-42 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-7, 9, 10, 13, 19, 20, 39, 40 are rejected under 35 U.S.C. 102(e) as being anticipated by Höhn et al. U.S. Patent 6,066,861.

Regarding claims 1, and 39, Höhn et al. disclose a light emitting device **(semiconductor body Fig. 2 ref. 1)**, comprising: a radiation source **(col. 2 lines 10-12)**; a luminescent material **(col. 8 lines 26-30; wavelength converting casting or potting composition ref. 5; layer comprising wavelength converting casting composition ref. 4)**; and a radiation scattering material **(transparent envelope made of epoxy, silicone, acrylate resin or ref. 15; col. 9 lines 19-28)** located between the

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radiation source and the luminescent material; wherein the radiation scattering material comprises radiation scattering particles located separately from the luminescent material (**col. 9 lines 19-28; col.8 lines 26-30**).

Regarding claim 2, Höhn et al. disclose the device of claim 1, wherein: the radiation source comprises a light emitting diode or a laser diode emitting radiation having a first peak wavelength (**col. 10 lines 8-12**); and the luminescent material comprises a phosphor which emits radiation having a second peak wavelength in response to incident radiation source radiation (**col. 1 lines 10-17**).

Regarding claim 3, Höhn et al. disclose the device of claim 2, wherein the radiation source comprises a blue or ultraviolet light emitting diode or laser diode (**col. 10 lines 8-12; col. 2 lines 10-13**); and the luminescent material comprises a phosphor layer or a dispersion of phosphor in a transmissive encapsulating material (**luminous substance particles ref. 6**).

Regarding claim 4, Höhn et al. disclose the device of claim 2, wherein: the radiation source comprises a blue light emitting diode (**col. 10 lines 8-12; col. 2 lines 10-13**); and the luminescent material comprises a yellow light emitting phosphor layer or a dispersion of a yellow light emitting phosphor (**col. 8 lines 33-35**) in a polymer material (**col. 8 lines 9-15**).

Regarding claim 5, Höhn et al. disclose the device of claim 4, wherein the light emitting diode comprises a blue emitting InGaN light emitting diode (**col. 5 lines 36-37; col. 4 line 45**) and the luminescent material comprises a dispersion of an epoxy or silicone and YAG:Ce³⁺ phosphor (**col. 4 lines 22-26**).

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Regarding claim 6, Höhn et al. disclose the device of claim 3, wherein the radiation source comprises an ultraviolet light emitting diode (**col. 10 lines 8-12; col. 2 lines 10-13**) and the luminescent material emits white light in response to the ultraviolet radiation emitted by the light emitting diode (**col. 6 lines 34-46**).

Regarding claim 7, Höhn et al. disclose the device of claim 2, wherein the luminescent material comprises an organic dye (**col. 9 lines 19-28**).

Regarding claim 9, Höhn et al. disclose the device of claim 2, wherein the radiation scattering material comprises radiation scattering particles in a carrier medium comprising a transmissive body (**col. 9 lines 19-28; transparent envelope ref. 15**).

Regarding claim 10, Höhn et al. disclose the device of claim 9, wherein: the radiation scattering particles comprises particles selected from a group consisting of TiO_2 and Al_2O_3 (**col. 9 lines 19-28**); and the carrier medium is selected from glass, silicone and plastic material (**col. 8 lines 20-25**).

Regarding claim 13, the device of claim 12, wherein the radiation scattering particles in a carrier medium comprise at least one of the following: a) at least one light or UV radiation scattering particle layer in a glass passivation layer directly over the light emitting diode (**col. 8 line 25**); and b) light or UV radiation scattering particles in a silicone layer over the light emitting diode or over and on sides of the light emitting diode (**col. 8 line 23**).

Regarding claim 19, Hohn et al. disclose the device of claim 1, wherein the radiation scattering material does not luminesce (**col. 9 lines 19-27**) and the

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luminescent material does not substantially scatter light or UV radiation (**col. 2 lines 20-21**).

Regarding claim 20, Hohn et al. disclose the device of claim 19, wherein the luminescent material comprises a nanocrystalline phosphor (**col. 2 lines 20-21**) or an organic dye (**col. 9 lines 19-27**).

Regarding claim 40, Hohn et al. disclose the light emitting device of claim 19, wherein the luminescent material comprises a nanocrystalline phosphor (**col. 2 lines 19-21**).

Claims 1, 2 and 39 are rejected under 35 U.S.C. 102(e) as being anticipated by Duggal et al. U.S. Patent 6,294,800.

Regarding claims 1, and 39, Duggal et al. disclose a light emitting device (**claim 18**), comprising: a radiation source (**claim 18**); a luminescent material (**claim 18**); and a radiation scattering material (**claim 18**) located between the radiation source and the luminescent material; wherein the radiation scattering material comprises radiation scattering particles located separately from the luminescent material (**claim 18**).

Regarding claim 2, Duggal et al. disclose the device of claim 1, wherein: the radiation source comprises a light emitting diode or a laser diode emitting radiation having a first peak wavelength (**col. 7 lines 65-67; col. 8 lines 1-15**); and the luminescent material comprises a phosphor which emits radiation having a second peak wavelength in response to incident radiation source radiation.

Claims 1, 2, 8 and 39 are rejected under 35 U.S.C. 102(a) as being anticipated by Chisato Japanese Publication 2000183408.

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Regarding claims 1, and 39, Chisato et al. disclose a light emitting device **(English Abstract)**, comprising: a radiation source **(English Abstract)**; a luminescent material **(English Abstract)**; and a radiation scattering material **(English Abstract)** located between the radiation source and the luminescent material; wherein the radiation scattering material comprises radiation scattering particles located separately from the luminescent material **(English Abstract)**.

Regarding claim 2, Chisato disclose the device of claim 1, wherein: the radiation source comprises a light emitting diode or a laser diode emitting radiation having a first peak wavelength **(English Abstract)**; and the luminescent material comprises a phosphor which emits radiation having a second peak wavelength in response to incident radiation source radiation.

Regarding claim 8, Chisato disclose the device of claim 2, wherein the radiation scattering material comprises a layer of packed radiation scattering particles **(English Abstract)**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hohn et al. U.S. Patent 6,066,861 in view of Frankel U.S. Patent 6,096,496.

Regarding claim 11, Hohn et al. teach all the limitations of claim 11, but fail to teach the radiation scattering particles comprise 140 to 240 nm particles. Frankel in the analogous art teach the radiation scattering particles comprise 140 to 240 nm particles (**col. 18 lines 30-35**). Additionally, Frankel teaches incorporation of such sized particles to improve scattering (**col. 18 line 30-35**).

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use the radiation scattering particles of Frankel in the semiconductor component of Hohn et al. since such a modification would improve scattering as taught by Frankel.

Claims 12, 21-24 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hohn et al. U.S. Patent 6,066,861.

Regarding claims 21, 12 and 41, Hohn et al. teach all the limitations of claim 21 (see rejection to claim 1), but fail to teach a package containing a reflector cup. Hohn in the analogous art teach a package containing a reflector cup (**col. 8 lines 35-54**). Additionally, Hohn teaches incorporation of such a package containing a reflector cup to improve reflecting emitted light and for use on surface-mounted or printed circuit boards (**col. 8 lines 35-54**). The incorporation of such a package containing a reflector cup would also be conventional.

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a package containing a reflector cup in the

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semiconductor component of Hohn et al. since such a modification would improve the reflection of emitted light and be applicable for use on surface-mounted or printed circuit boards as taught by Hohn et al.

Referring to claim 22, Hohn et al. teach all of the limitations of the claim. Hohn et al. teach the device of claim 21, wherein: the light emitting diode comprises a blue or an ultraviolet light emitting diode (**col. 5 lines 36-37; col. 4 line 45**); the radiation scattering particles comprise light or UV radiation scattering particles in a carrier medium (**col. 9 lines 19-29**); and the luminescent material comprises a yellow or white light emitting phosphor layer or a dispersion of a phosphor in an epoxy or silicone (**col. 4 lines 22-26**).

Referring to claim 23, Hohn et al. teach all of the limitations of the claim. Hohn et al. teach the device of claim 22, wherein the light emitting diode comprises a light emitting diode having an emission wavelength of 365 to 420 nm (**col. 4 line 59**); and the luminescent material comprises: i) a white light emitting phosphor layer comprising one or more phosphors; or ii) a dispersion of a least one phosphor and an epoxy or silicone (**col. 4 lines 22-27**).

Referring to claim 24, Hohn et al. teach all of the limitations of the claim. Hohn et al. teach the device of claim 22, wherein the light emitting diode comprises a blue emitting InGaN light emitting diode (**col. 4 line 45**) and the luminescent material comprises a dispersion of an epoxy or silicone and a YAG:Ce³⁺ phosphor (**col. 6 lines 34-46**).

Allowable Subject Matter

Claims 36-38 and 42 are allowed.

Claims 14-18 and 25-31 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 14, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a device including the combination of all the limitations as set forth in claim 14, and specifically a light or UV radiation scattering layer on sidewalls of a reflector cup portion of the package containing the light emitting diode could not be found elsewhere in prior art.

Regarding claim 15, claim 15 is allowed for the reasons given in claim 14, because of its dependency status on claim 14.

Regarding claim 16, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a device including the combination of all the limitations as set forth in claim 16, and specifically "wherein the radiation scattering particles in a carrier medium comprise at least two layers of TiO₂ particles in about a 1 micron to about a 2 micron thick silica layer arranged to achieve photonic crystal effects" could not be found elsewhere in prior art.

Regarding claim 17, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a device including the

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combination of all the limitations as set forth in claim 17, and specifically wherein a mean diameter of the radiation scattering particles is between $\lambda/3$ and $\lambda/2$, where λ is the peak emission wavelength of the radiation source could not be found elsewhere in prior art.

Regarding claim 18, claim 18 is allowed for the reasons given in claim 17, because of its dependency status on claim 17.

Regarding claim 25, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a device including the combination of all the limitations as set forth in claim 25, and specifically the radiation scattering particles are selected from a group consisting of TiO_2 , BaTiO_3 , Al_2O_3 , SiO_2 , CaCO_3 , BaSO_4 and diamond particles having a mean diameter of 50 to 500nm could not be found elsewhere in prior art.

Regarding claims 26-30, claims 26-30 are allowed for the reasons given in claim 25, because of their dependency status on claim 25.

Regarding claim 31, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a device including the combination of all the limitations as set forth in claim 31, and specifically wherein a mean diameter of the radiation scattering particles is between $\lambda/3$ and $\lambda/2$, where λ is the peak emission wavelength of the radiation source; and the radiation scattering particles scatter at least 50% more radiation source radiation than luminescent material radiation could not be found elsewhere in prior art.

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Regarding claim 36, the following is an examiner's statement of reasons for allowance: The prior art of record neither shows nor suggests a light emitting device including the combination of all the limitations as set forth in claim 36, and specifically a luminescent material layer which does not substantially exhibit Mie scattering; and a radiation scattering phosphor layer, which exhibits Mie scattering of the radiation source radiation, located between the radiation source and the luminescent material could not be found elsewhere in prior art.

Regarding claims 37, 38 and 42, claims 37, 38 and 42 are allowed for the reasons given in claim 36, because of their dependency status on claim 36.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenn Zimmerman whose telephone number is (703) 308-8991. The examiner can normally be reached on M-F.

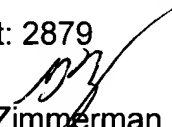
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is n/a.

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Glenn Zimmerman
February 3, 2003


ASHOK PATEL
PRIMARY EXAMINER